R&D

Research & Development

BIOMATERIALS
UCLA's Nir Kossovsky questions compatibility of medical implants

Executive of the Year: HP's John Young

Did quest for glory bloody science's nose?

INTERNATIONAL JOURNAL OF RESEARCH, DEVELOPMENT, AND QUALITY ASSURANCE

R&D

CONTENTS

R&D BUSINESS

13 INTELLECTUAL PROPERTY
Patent rights need global protection.
▶ **COMPETITION**
MIT report stirs response from industry.

14 PARTNERSHIP
Japan's NTT Data joins new U.S. lab.
▶ **MANUFACTURING**
Most U.S. industries use advanced technologies in their operations.
▶ **PROGRAMMING**
Computer companies jump on the OOP bandwagon.

NEWS

18 SPACE
After three years' delay, 'Galileo' is ready for voyage to Jupiter.

19 SCIENCE POLICY
'Chronic problems' at military labs threaten U.S. technology leadership.
▶ Critical technologies scorecard: U.S., 13; Japan/USSR, 9.

20 AVIATION
Computer codes help design the National Aerospace Plane.

22 BIOTECHNOLOGY
Tandem MS speeds up protein sequencing by a factor of 100.

24 TECHNOLOGY TRANSFER
Patience is required in Dept. of Energy tech transfer to industry.
▶ Russian immigrant scientists get help in Israel.

26 SUPERCONDUCTIVITY
Will HTS materials find a home in induction motors?

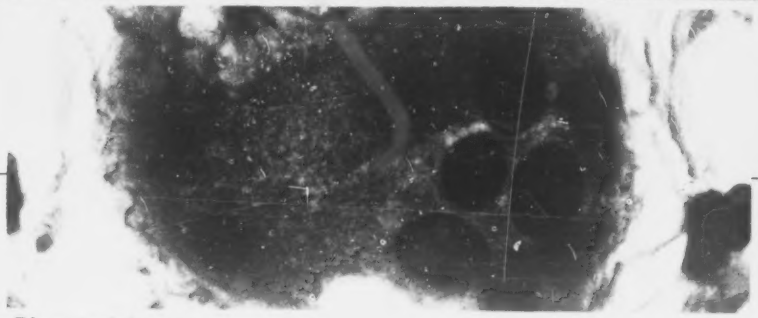
28 ENVIRONMENT
Scientists want to cultivate clean air on microalga farms.
▶ **COMMUNICATIONS**
Europe readies its large TV satellite.

FEATURES

BIOMATERIALS
48 **It's a Great New Material, But Will the Body Accept It?**
Nir Kossovsky, UCLA Medical Center, Dept. of Pathology
Developing materials that living tissue won't reject requires knowledge of biological interactions. It also requires a combined effort of engineers and medical personnel.

AWARDS
60 **John Young of Hewlett-Packard Named Executive of the Year**
Robert Cassidy, Editor-in-Chief, and Elizabeth Dougherty, Assistant Editor, R&D *magazine*
R&D magazine's unanimous choice for its first Executive of the Year award is more than a computer company CEO. He's also a national spokesman for competitiveness.

VACUUM TECHNOLOGY
71 **Two New Processes Make Circuitry a Part of the Part**
Frank Wood and Jim Templin, Allen-Bradley
Decal processes allow polymer-based circuitry to be molded onto, or even in, three-dimensional objects. The processes also allow the circuitry to operate at high temperatures and in harsh chemical, physical, and electrical environments.



Biomaterials, page

Executive of the Year, page 60

DEPARTMENTS

5 R&D NEWS IN BRIEF

11 EDITORIAL

13 R&D BUSINESS

18 R&D NEWS OF SCIENCE AND TECHNOLOGY

33 SPECIAL REPORT

43 LETTERS

71 VACUUM TECHNOLOGY

81 PEOPLE, ETC.

87 NEW PRODUCTS

91 READER SERVICE CARD

99 R&D PRODUCT CENTER

103 LITERATURE

110 ADVERTISERS INDEX

112 R&D TRENDLETTER

SPECIAL REPORT

33 COLD FUSION

Press conference *vs* peer review: Will science ever recover from the cold fusion furor? After all of the hype, cold fusion finally gets back to science.

COLUMN

41 INNOVATIVE NOTEBOOK

A return visit to Fred Jueneman's first column for *R&D* magazine, "A place to hang your sky hook," offers the vision of "a suspension bridge to space."

STAFF

Robert Cassidy
Editor-in-Chief

Gary L. Parr
Managing Editor

Charles S. Derra
Associate Editor, News

Timothy G. Studt
Associate Editor

Elizabeth Dougherty
Assistant Editor

Sandra Jean Brown
Editorial Production Manager

Jean Nickle
Production Editor

Joan Cacioppo
Editorial Assistant

Tina Lentz
R&D 100 Coordinator

Mary Hincker
Promotion Manager

Thomas Kane
Marketing Research

William J. Stanners
Comptroller

Timothy M. Kelly
Publisher and Vice President

Robert R. Jones
Executive Editor

Antonios Pronoitis
V.P. and Exec. Art Director

Judy Whitt
Director, Art Dept.

Donna Kurzydlo
Senior Art Director

Phillip Hanes
Associate Art Director

Patricia Miller
Business Manager

Marylyn Dorsett
Advertising Sales Assistant

Laura Smith
Advertising Production

Linda Saiz
Advertising Contracts

Ruben Natal
Circulation Manager

Frank Pruzina
Reprints

Editorial, Executive, and Sales Offices
Box 5080, Des Plaines, IL 60017-5080, USA. Telephone 312/635-8800

EDITORIAL BOARD

C.J. Mosbacher, former Editor *R/D* and Executive Editor *R&D*, Chairman
Anna D. Barker, Senior Vice President, Battelle Technology International
H. Kent Bowen, Ford Professor of Engineering, Massachusetts Inst. of Technology
R.F. Bunshah, Professor of Engineering, Univ. of California–Los Angeles
E. Richard Cohen, Distinguished Fellow, Rockwell International Science Center
Raymond R. Fessler, Director, Basic Industry Research Lab, Northwestern Univ.
Paul Kucera, Analytical Development, Lederle Laboratories
Milos V. Novotny, Department of Chemistry, Indiana Univ.
Alan Schriesheim, Director, Argonne National Laboratory
Dan W. Urry, Molecular Biophysics, Univ. of Alabama at Birmingham

Laboratory of the Year Program Adviser
Fred L. Bernheim, FARA, Bernheim & Kahn Ltd., Architects

Intellectual properties need global protection

A COMPANY'S PATENTS and trade secrets are critical to its success in domestic and world markets. However—

- protection of intellectual properties can vary greatly from country to country, and
- U.S. court rulings now heavily favor support of patents.

The need to protect intellectual properties is more pressing than ever due to increased global competition, counterfeiting problems, and the development of new technologies, such as advanced microelectronics and genetic engineered materials.

Many countries, especially those undergoing development, are reluctant to recognize or enforce intellectual property rights. Brazil, Indonesia, and India, for example, have virtually no patent or trademark laws. Taiwan, China, and Korea punish hard goods counterfeiters with a slap on the wrist. A few countries can inflict huge losses on U.S. industries (see table).

Even Japan often is listed among those countries that fail to enforce intellectual property rights—a sore point in Japan-U.S. trading relations.

To counter increasing U.S. demands for trade concessions, Japanese companies recently have expanded their property protection capabilities.

Within the past year, Mitsubishi Electric Co., Sharp Co., Toshiba Corp., Matsushita Electric Industrial Co., and Hitachi Ltd. have reorganized, enlarged, or set up substantial intellectual property departments in their Japanese headquarters. These companies already receive large numbers of U.S. patents. Their recent efforts should increase those numbers.

As for the U.S. legal system's about-face on patent protection, one measure is the size of recent judgments, such as the multibillion-dollar award Polaroid obtained from Kodak for patent infringement. This reverses the judiciary's attitude of less than 10 years ago when judges were compelled to abandon patent cases in order to prosecute criminal cases.

"At the present time, the inventor smart enough to obtain a patent on his development is king," says William Wesley, a patent attorney for Fermilab and the superconducting supercollider project in Texas. "More damage awards are routinely approved by the Federal Circuit Court of Appeals than ever before," he says.

BUSINESS

"The pendulum has swung in favor of patent owners," says Fermilab's patent attorney William Wesley.

But to protect a patent, a company often must file its application before product development is complete. This can lead to incomplete information, jeopardizing the patent's value.

Or worse. "When other people get the initial patent information, they can go to the next product development step or pursue alternatives quicker than you can," says Ronald Berenbeim of the Conference Board, a New York business group. □

Productivity report stirs response from industry

MIT'S RECENT REPORT, "Made in America: Regaining the Productive Edge," has resulted in "a tremendous number of inquiries from industry and universities," says Michael Dertouzos, chairman of MIT's Commission on Industrial Productivity. Several companies and universities are already using the report as a basis for their own studies.

At MIT itself, the two-year-long study led to the creation in 1988 of the Leaders for Manufacturing program and a Lab for Manufacturing

Poor foreign patent enforcement takes money from U.S. pockets

Country	U.S. losses to foreign countries*
Taiwan	$752
Mexico	533
Korea	496
Brazil	426
China	420
Canada	367
India	244
Japan	192
Nigeria	158
Hong Kong	154
Saudi Arabia	131
Indonesia	130
Italy	110
Spain	103

*Millions of U.S. dollars
Source: Intl. Trade Commission

Poor intellectual property protection cost 168 U.S. firms more than $4 billion in 1986.

ADVERTISERS INDEX

	Page No.	Circle No.
ADPI Analog & Digital Peripherals, Inc.	100	177
ATM Test Sieves, Inc.	101	184
Ace Glass Inc.	99	175
Advanced Pressure Products	99	173
ALCOA Aluminum Company of America	68	139
Allied Signal Engineered Plastics	83	153
Amoco Laser Company	102	189
Amplifier Research	105	191
Anotec Separations	29	117
Ark-Plas Products, Inc.	89	161
Balzers	104	190
Binary Engineering	108	195
Bio-Rad Digilab Div.	45	132
BriskHeat Corporation	100	181
Buehler Ltd.	BC	199
CHA Industries	53	135
Cahn Instruments, Inc.	25	112
Cajon Co., A Swagelok Co.	84	154
Carley Lamps	101	183
Carter Analytical Laboratory	107	151
Fred S. Carver, Inc.	44	130
CERAC, Incorporated	88	158
Circle Seal Controls	105	194
Compaq Computer Corp.	55-58	
Concurrent Computer Corp.	65	137
Coulter Corp. Scientific Instruments	23	110
Danielson Associates	74	143
Design Engineering Show & Conference/West	93	163
Digital Equipment Corp.	8-9	
Eastman Kodak Co.	111	197
Fluid Metering Inc.	89	160
John Fluke Mfg. Co. Inc.	101	186
*John Fluke Mfg. Co. Inc.	16-17	106
Galactic Industries Corp.	88	159
Gifts-In-Kind Clearing House	96	168
Gilson Company, Inc.	101	188
Gilson Medical Electronics Inc.	106	192
Glassman High Voltage Inc.	4	102
Gould Inc. Recording Systems Div.	97	166,169
Test & Measurement Group	10	103
Granville-Phillips	70	141
HPS Division of MKS Instruments, Inc.	96	167
Hitachi Scientific Instruments	30	118
Hughes Aircraft Company	107	193
Huntington Laboratories, Inc.	72	142
IBM Corporation	27	115
The Indium Corp. of America	28	116
Industrial Research Exposition & Conference	100	182
Insulator Seal Incorporated	24	111
Intergraph Corp.	46	133
IO Tech, Inc.	100	180
J&L Instruments Corp.	74	144
Jaco	99	171
Keithley Instruments Inc.	80	150
Labconco Corp.	100	179
Laboratory Technologies Corp.	98	170
Lake Shore Cryotronics	109	196
Lasertechnics	32	128
Leybold-AG	79	149
Leybold Vacuum Products, Inc.	99	172
Lindberg/Blue M, A Unit of General Signal	26	113,114
MDC Vacuum Products Corp.	69	140
Matheson Gas Products	31	119-126
Mettler Instrument Corp.	42	129
	82	152
	85	156
NIRSystems	86	157
National Electrostatics Corp.	44	131
National Instruments	IBC	198
Newport Corporation	IFC	100
The J.M. Ney Co. Neytech Div.	99	176
Nikon Inc., Instrument Group	15	105
Nor-Cal Products, Inc.	75	145
Nupro Company, A Swagelok Company	84	155
Olympus Corporation	67	138
	78	148
Omega Engineering, Inc.	3	101
Parr Instrument Co.	101	185
†Philips	16-17	107
Polymetrics, Inc.	107	201
QuanScan, Inc.	22	109
Quantum Design	12	104
Rolyn Optics	100	178
SLM Instruments, Inc.	47	134
Setra Systems	94	164
†Siemens	90A	23
Silicon Graphics	40	
Strawberry Tree Computer, Inc.	82	202
Structured Software Systems, Inc.	101	187
Surcom Associates, Inc.	99	174
TRW	90	162
Tektronix Inc.	35-38	200
Tencor Instruments	77	147
Upchurch Scientific	94	165
Varian Associates	21	108
VAT, Inc.	59	136
Zircar Products, Inc.	76	146

*Domestic
†Foreign

CIRCULATION

Research & Development (ISSN 0746-9179) is published monthly except semimonthly in February and March by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington St., Newton, MA 02158-1630. Terrence M. McDermott, President; Charles E. Moodhe, Senior Vice President/General Manager, Chicago Division; Jerry D. Neth, Vice President/Publishing Operations; J.J. Walsh, Financial Vice President/Magazine Division; Thomas J. Dellamaria, Vice President/Production and Manufacturing; Timothy M. Kelly, Vice President and Publisher; Neil P. Ruzic, founder of *Industrial Research*.

Circulation records are maintained at Cahners Publishing Company, 44 Cook St., Denver, CO 80206-5800 (phone: 303/388-4511). **Circulation:** More than 120,000 copies distributed. Second-class postage paid at Denver, CO 80206-5800, and at additional mailing offices. **Postmaster:** Send address corrections to *Research & Development* at our Denver address.

Subscription rates for nonqualified people: USA, 1 yr $45, 2 yr $85; Canada and Mexico, 1 yr $55, 2 yr $100; all other countries, 1 yr $80, 2 yr $150; air mail surcharge, 1 yr $45, 2 yr $90. Except for special issues where price changes are indicated, single copies of regular issues are available for $10. Address all subscription mail to *Research & Development*, 44 Cook St., Denver, CO 80206-5800. Include zip code and, for change of address, copy of old label.

Research & Development copyright 1989 by Reed Publishing USA; Ronald G. Segel, Chairman and Chief Executive Officer; Robert L. Krakoff, President and Chief Operating Officer; William M. Platt, Senior Vice President.

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage retrieval system, without written permission of the copyright owner. Prices for bulk reprints of articles available on request. Copies of back issues are available from University Microfilm, 300 N. Zeeb Rd., Ann Arbor, MI 48106, and on microfiche from Micro-Photo Div., Bell & Howell, Old Mansfield Rd., Wooster, OH 44691. *Research & Development* articles are indexed in Engineering Index, Current Contents, and New York Times Information Bank.

Cahners Publishing Company, A Division of Reed Publishing USA □ Specialized Business Magazines for Building & Construction □ Manufacturing □ Foodservice & Lodging □ Electronics & Computers □ Interior Design □ Printing □ Publishing □ Industrial Research & Technology □ Health Care □ Entertainment □ Specialized Consumer Magazines: American Baby □ Modern Bride

ABP BPA ABC